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UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

DOCKETED  
USNRC

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

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In the Matter of )  
METROPOLITAN EDISON COMPANY, ET AL. )  
(Three Mile Island Nuclear Station, )  
Unit No. 1) )

Docket No. 50-289 *OLA*  
(Steam Generator Repair)

NRC STAFF PROPOSED FINDINGS OF FACT, CONCLUSIONS  
OF LAW, AND ORDER IN THE FORM OF AN INITIAL DECISION

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August 20, 1984

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TABLE OF CONTENTS

	<u>Page</u>
I. BACKGROUND .....	1
II. TMIA CONTENTION 1.a (ADEQUACY OF REPAIR TECHNIQUE, POST REPAIR AND PLANT PERFORMANCE TESTING, AND PROPOSED LICENSE CONDITIONS) .....	2
A. Issue 1.a (Reliability of Leak Rate Measurements) .....	2
B. Issue 1.b (Frequency of Eddy Current Testing) .....	3
C. Issue 1.c (Power Ascension Limitations) .....	5
D. Issue 1.d (Long Term Corrosion Tests) .....	6
E. Issue 2 (Inadvertent Initiation of Emergency Feedwater Flow) .....	6
F. Issue 3 (Hardness Testing on Repaired Tubes) .....	6
G. Issue 4 (Effectiveness of Kinetic Expansion as a Repair Versus a Manufacturing Process) .....	7
III. TMIA CONTENTION 1.b (ISSUE 5--EFFECT OF REPAIR PROCESS ON PROBABILITY OF SIMULTANEOUS TUBE RUPTURE) .....	7
IV. CONCLUSIONS OF LAW .....	7
V. ORDER .....	8

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I. BACKGROUND

1. The Staff adopts Licensee's Finding of Fact ¶ 1.
2. The amendment request would permit operation of TMI-1 with steam generator tubes repaired by the kinetic expansion repair process. The current Technical Specifications authorize only the use of the "plugging" method as a means of repairing leaking tubes.
3. The Staff adopts Licensee's Finding of Fact ¶ 2.
4. The issues in this case were narrowed substantially by the Board's Memorandum and Order (Ruling on Motions for Summary Disposition) dated June 1, 1984, ("Order"), which disposed of nine of the eleven admitted contentions. With respect to the remaining parts of the two contentions not dismissed, the Board identified specific issues on which it wanted to hear evidence. Order at 23, 32.
5. The Staff adopts Licensee's Finding of Fact ¶ 3.

6. The eight issues of concern identified in the Board's Order related to reliability of leak rate measurements (Issue 1.a), frequency of eddy current testing (Issue 1.b), power ascension limitations (Issue 1.c), long term corrosion tests (Issue 1.d), inadvertent initiation of emergency feedwater (Issue 2), hardness testing on repaired tubes (Issue 3), effectiveness of kinetic expansion as a repair versus a manufacturing process (Issue 4), and effect of repair process on probability of simultaneous tube ruptures (Issue 5). These issues are discussed in turn below.

II. CONTENTION 1.a (ADEQUACY OF REPAIR  
TECHNIQUE, POST REPAIR AND PLANT PERFORMANCE  
TESTING, AND PROPOSED LICENSE CONDITIONS)

7. The Staff adopts Licensee's Findings of Fact ¶¶ 4-6.

A. Issue 1.a (Reliability of Leak Rate Measurements)

8. The Staff adopts Licensee's Findings of Fact ¶¶ 7-9.

9. The reliability of leak rate measurements is addressed in proposed license condition No. 4, which states:

The licensee shall confirm the baseline primary-to-secondary leakage rate established during the steam generator hot test program. If leakage exceeds the baseline leakage rate by more than 0.1 gpm, the plant shall be shutdown and leak tested. If any increased leakage above baseline is due to defects in the tube free span, the leaking tube(s) shall be removed from service. The baseline leakage shall be reestablished, provided that the present Technical Specification limit of 1.0 gpm is not exceeded (SE Section 3.3).

Staff - Cont. 1.a, ff. Tr. 589, at 4.

10. The Staff adopts Licensee's Findings of Fact ¶ 11-13.

11. The Staff adopts Licensee's Finding of Fact ¶ 14(a), (b), (d) and (e). The Staff also adopts Licensee's Finding of Fact ¶ 14(c), but corrects the value for the monitored leak rate statistical variation to "approximately  $\pm 0.01$  GPM ( $\pm 0.5$  GPH)." "Testimony of Richard F. Wilson, David G. Slear and Don K. Croneberger on Issue 1a (Contention 1a)," ff. Tr. 224, at 7 (hereinafter "Licensee - Issue 1a").

12. The Staff adopts Licensee's Findings of Fact ¶¶ 15-18.

13. The relevance of leak rate measurements made at TMI-1 to the repairs made on the TMI-1 tubes is that the measurement of total primary-to-secondary leakage from the steam generators includes the contribution from leakage through the joints. Some leakage is to be expected, and small leakage through the joint does not indicate a reduction in load carrying capability. Tr. 269 (Slear). As previously described, if the nominal leak rate increases by 0.1 GPM, the plant will be shut down and the individual leaking tubes, plugs and/or joints will be identified by the nitrogen bubble test and drip tests discussed above. Licensee - Issue 1.a , ff. Tr. 421, at 12.

14. The Staff adopts Licensee's Findings of Fact ¶¶ 20-28.

15. Based on the uncontradicted evidence, as set forth above, the Board finds that proposed license condition No. 4 provides a rapid determination as to the source and amount of any increased primary to secondary leakage and provides adequate assurance that the leakage will be responded to prior to the potential for tube rupture.

B. Issue 1.b (Frequency of Eddy Current Testing)

16. The Staff adopts Licensee's Findings of Fact ¶¶ 30-32.



17. The frequency of eddy current tests is addressed in proposed license condition No. 3, which states:

The licensee shall conduct eddy-current examinations, consistent with the inspection plan defined in Table 3.31, either 90 calendar days after reaching full power, or 120 calendar days after exceeding 50% power operation whichever comes first.

"Testimony of Conrad E. McCracken and Paul C. Wu on TMIA Contention 1.a," ff. Tr. 589, at 6 (hereafter "Staff - Cont. 1.a")

18. The Staff adopts Licensee's Findings of Fact ¶¶ 33-37.

19. On cross-examination by the Board (Judge Hetrick), Staff witness McCracken was asked whether there were any additional license conditions which he would like to see the Board impose. Mr. McCracken responded that in reviewing the existing proposed license conditions, he saw only one potential plant condition which he did not anticipate when he drafted the proposed conditions: that the plant might run for an extended period of time, even up to a full fuel cycle, without exceeding 50 percent power. If that were to occur, the Staff would like to see another ECT sometime in the middle of the cycle, possibly after 180 or 200 days. Mr. McCracken did not state that he wished to see such a license condition added to the license amendments, however. He indicated that, if Licensee operated for an extended period of time without exceeding 50 percent power, he would be inclined to go to Licensee and tell them that the Staff would like them to shut down and conduct eddy current tests, which he assumed they would be amenable to doing. Tr. 672-73 (McCracken).

20. Based on the foregoing, the Board finds that proposed license condition No. 3, together with the existing license conditions, provide reasonable assurance that, in the unlikely event of reinitiation of

corrosion, it would be detected in a timely manner and corrective action taken such that the health and safety of the public would be protected.

C. Issue 1.c (Power Ascension Limitations)

21. The Staff adopts Licensee's Findings of Fact ¶ 39.

22. Power ascension limitations are addressed in proposed license condition Nos. 1 and 2, which state:

No. 1

The licensee shall complete its precritical test program in essential conformance with the program described in its Topical Report 008, Rev. 2, and shall submit the results of that test program and a summary of its management review, prior to initial criticality.

No. 2

The licensee shall complete its postcritical test program at each power range (0-5%, 5%-50%, 50%-100%) in essential conformance with the program described in Topical Report 008, Rev. 2, and shall have available the results of that test program and a summary of its management review, prior to ascension from that power range and prior to normal power operation.

Staff - Cont. 1.a, ff. Tr. 589, at 9.

23. With respect to proposed license conditions Nos. 1 and 2, which relate to power ascension, Staff testified that the conditions are not intended to limit power ascension. Instead, the proposed conditions are intended to require that test results be made available to the NRC at each stage of the power ascension test program. Staff further testified that the Staff does not consider power ascension limitations to be a requirement of the OTSG repair program because the steam generators have been repaired to their original licensing basis which is consistent with full power operation. Staff - Cont. 1.a, ff. Tr. 589, at 9-10.

24. The Staff adopts Licensee's Findings of Fact ¶¶ 41-54.

D. Issue 1.d (Long Term Corrosion Tests)

25. The Staff adopts Licensee's Finding of Fact ¶ 55.

26. Long-term corrosion tests are required by proposed license condition No. 6, which states:

The licensee shall provide routine reporting of the long-term corrosion "lead tests" test results on a quarterly basis as well as more timely notification if adverse corrosion test results are discovered (SE Section 3.5).

Staff - Cont. 1.a, ff. Tr. 589, at 11.

27. The Staff adopts Licensee's Findings of Fact ¶¶ 56-74.

E. Issue 2 (Inadvertent Initiation of Emergency Feedwater Flow)

28. The Staff adopts Licensee's Finding of Fact ¶ 75.

29. Staff testified that the design basis accident that would place the most severe loads on the OTSG tubes would be a break in the main steam lines (MSLB). A MSLB would result in maximum tube load of 3140 pounds. Staff - Cont. 1a, ff. Tr. 589, at 13-14.

30. The Staff adopts Licensee's Findings of Fact ¶¶ 76-81.

31. In addition, Licensee testified that currently there is no signal installed that would initiate the emergency feedwater system as a result of a MSLB. Tr. 426-27 (Lee). There was no evidence to the contrary.

32. The Staff adopts Licensee's Finding of Fact ¶ 82.

F. Issue 3 (Hardness Testing on Repaired Tubes)

33. The Staff adopts Licensee's Findings of Fact ¶¶ 83-94.

34. The Staff adopts Licensee's Finding of Fact ¶ 95, noting that there is a typographical error in the last line of that paragraph, in that "Staff - Cont. 1.2 at 17" should read "Staff - Cont. 1.b at 17."



35. The Staff adopts Licensee's Findings of Fact ¶¶ 96-97.

G. Issue 4 (Effectiveness of Kinetic Expansion as a Repair Versus a Manufacturing Process)

36. The Staff adopts Licensee's Findings of Fact ¶¶ 98-116.

III. CONTENTION 1.b (ISSUE 5 - EFFECT OF REPAIR PROCESS ON PROBABILITY OF SIMULTANEOUS TUBE RUPTURE)

37. The Staff adopts Licensee's Findings of Fact ¶¶ 117-131.

IV. CONCLUSIONS OF LAW

The Board has considered all of the evidence submitted by the parties and the entire record of this proceeding. Based on the Findings of Fact set forth herein, which are supported by reliable, probative and substantial evidence in the record, this Board, having decided all matters in controversy, concludes that, pursuant to 10 C.F.R. § 2.760a and 10 C.F.R. § 50.92:

A. Licensee has carried its burden of proof and demonstrated there is reasonable assurance that:

- (1) The kinetic expansion repair technique provides reasonable assurance that operation of TMI-1 can be conducted without endangering the public health and safety;
- (2) Proposed license conditions Nos. 1, 2, 3, 4 and 6, together with post repair and plant performance testing, are adequate to assure against steam-generator tube ruptures; and

(3) The use of the kinetic expansion repair process at TMI-1 has not increased the probability of simultaneous tube rupture involving both steam generators.

B. The Director of Nuclear Reactor Regulation should be authorized to issue to Licensee, upon making requisite findings not embraced in this Initial Decision, an amended license authorizing operation of the Three Mile Island Nuclear Station, Unit No. 1, with the as-repaired steam generator tubes.

#### V. ORDER

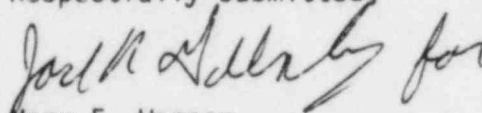
WHEREFORE, IT IS ORDERED that the Director of Nuclear Reactor Regulation is authorized, upon making all requisite findings not embraced by this Initial Decision, to issue Licensee an amendment to its operating license recognizing the kinetic expansion tube repair technique, thereby authorizing operation of TMI-1 with the as-repaired steam generator tubes. Such amendment should contain, as license conditions, proposed license conditions Nos. 1, 2, 3, 4 and 6 as set forth in NUREG-1019 and Supplement 1 thereto.

IT IS FURTHER ORDERED that this Initial Decision will constitute the final decision of the Commission thirty days from the date of its issuance, unless an appeal is taken in accordance with 10 C.F.R. 2.762 or the Commission directs otherwise. See also 10 C.F.R. §§ 2.785 and 2.786.

Pursuant to 10 C.F.R. § 2.762, an appeal from this Initial Decision may be taken by filing a Notice of Appeal with the Atomic Safety and

Licensing Appeal Board within 10 days after service of this decision. Such notice shall specify the party taking the appeal and the decision being appealed. A brief in support of such appeal must be filed within 30 days after the filing of the notice of appeal (40 days if the appellant is the NRC Staff). Within 30 days after the period for filing and service of the briefs of all appellants has expired, any party not an appellant may file a brief in support of or in opposition to the appeal. The NRC Staff may file a responsive brief within 40 days after the period for filing and service of the briefs of all appellants has expired. A responding party shall file a single responsive brief, regardless of the number of appellants' briefs filed.

Respectfully submitted,

  
Mary E. Wagner  
Counsel for NRC Staff

Dated at Bethesda, Maryland  
this 20th day of August, 1984